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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

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INVENTOR(S)

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Additional inventors are being named on the 0 *separately numbered sheets attached hereto*

TITLE OF THE INVENTION (500 characters max)

COOPERATIVE NETWORK CENTRIC COUNTER MANPADS AIRBORNE COUNTERMEASURES SYSTEM

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

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ENCLOSED APPLICATION PARTS *(check all that apply)*

☑ Specification *Number of Pages* 6
☑ Drawing(s) *Number of Sheets* 4
☐ Application Data Sheet. See 37 CFR 1.76
☐ CD(s), Number
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☑ No.
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Respectfully submitted,

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Date 6/10/04

REGISTRATION NO. 29,404 *(if appropriate)*

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COOPERATIVE NETWORK CENTRIC COUNTER MANPADS AIRBORNE COUNTERMEASURES SYSTEM

Background of the Invention

1. Field of the Invention.

The present invention relates to countermeasures for protecting aircraft from missile threats. More particularly this invention relates to countermeasures for protecting aircraft from Man Portable Air Defense Systems (MANPADS) threats.

2. Brief Description of Prior Developments.

Recently there has been an increased interest in protecting commercial aircraft from attacks carried out by terrorists by means of a class of shoulder fired ground to air missile systems known as MANPADS. It is possible that independent MANPADS defense systems which are mounted on commercial aircraft which are landing or taking off in line or on adjacent runways may interfere with each other if multiple aircraft detect or counter the same threat.

A need, therefore, exists for a means to overcome the above possible disadvantage of the prior art.

Summary of Invention

The method and network of the present invention provides a way to cooperatively manage the individual detection and nullification responses of Airborne Countermeasures Systems (ACS). A Central Countermeasures Management System (CCMS) is deployed at each airport. An ACS is deployed on each aircraft and are networked to the CCMS. The CCMS controls the individual ACS's. This control includes detecting, discriminating, and declaring attacks with assigned confidence. The control also includes assigning threats to

individual ACS's, and countering those threats. The control also includes geo-locating launch locations.

It is believed that aircraft equipped with such counter MANPADS systems may help each other by cuing aircraft that may not have detected attacks due to launch ranges, or jamming second and third shots against aircraft whose counter measures may be unavailable because they are jamming a first and second threat.

It is also believed that autonomous ACS's can improve their performances against multiple near simultaneous attacks when landing at busy airports if adjacent or in line aircraft could help defend against these stressing assaults. Also the possibility of ACS to ACS interference could be eliminated if a CCMS existed. The CCMS could use warning data from the pattern of landing and departing aircraft to geo-locate the launch point. And the CCMS could fuse threat data and warnings from DHS, and other government data bases, with the sensor warning data from the arriving and departing aircraft to compute a confidence level on the attack notification provide to DHS.

Brief Description of the Drawings

The present invention is further described with reference to the accompanying drawings wherein:

Fig. 1 is a schematic drawing illustrating cooperative jamming multiple threats in a preferred embodiment of the present invention;

Fig. 2 is a schematic drawing illustrating informational architecture in the method illustrated in Fig.1;

Fig. 3 is a schematic drawing illustrating the Central Countermeasures Management System (CCMS) in the method shown in Fig. 1; and

Fig. 4 is a further schematic block diagram illustrating the method shown in Fig. 1.

Detailed Description of the Preferred Embodiment

Referring to Fig. 1, in the method of the present invention there is a Central Countermeasures Management System (CCS). There is also an Airborne Countermeasures System (ACS) for each of the aircraft. The systems ACS 1, 3, 4 and 6 each provide an emergency notification message of aircraft position including latitude, longitude, altitude, and time. These messages also include aircraft orientation including roll, horizon elevation, azimuth nothing, and time. These messages also includes countermeasure status. If, for example, the CCMS processes information and tasks ACS 6 And 4 to jam threats 2 and 3, there would be a countermeasure target assignment. An emergency notification would also be provided to DHS with a confidence factor.

Referring to Fig. 2 the down link of emergency notification message provides aircraft identification, threat identification and confidence, warning confidence and vector to threat, including azimuth, elevation, range and time. The down link also provides aircraft position including latitude, longitude, altitude and time, aircraft orientation including roll, horizon elevation, and time and countermeasures status. The uplink provides countermeasures target assignment.

Referring to Figs. 3 and 4, there are further schematic drawings concerning the method of the present invention.

It will be appreciated by those skilled in the art that the method and apparatus have the following advantages.

1) The method and apparatus of this invention improves notification confidence level by fusing cuing data from multiple ACS's with threat warning data, and known false alarm sources.
2) The method and apparatus of this invention allows geo-location of threat launch point, to be calculated on the ground using the CCMS.
3) The method and apparatus of this invention allows ACS's to be de-tasked to prevent Multi-platform interference from closely spaced aircraft.

4) The method and apparatus of this invention allows ACS's on closely spaced aircraft to be cooperatively tasked to defend against salvo assault aimed at overwhelming a single ACS.

5) The method and apparatus of this invention is based on Dempster Shaffer fusion technique

While the present invention has been described in connection with the preferred embodiments of the various figures, it is to be understood that other similar embodiments may be used or modifications and additions may be made to the described embodiment for performing the same function of the present invention without deviating therefrom. Therefore, the present invention should not be limited to any single embodiment, but rather construed in breadth and scope in accordance with the recitation of the appended claims.

Claims

What is claimed is:

1. A method for operating a defense against Man Portable Air Defense Systems (MANPADS) threats comprising the steps of:

deploying a plurality of airborne countermeasures systems (ACS) on each of a plurality of aircraft;

deploying a central countermeasures management system (CCMS) and networking the ASC systems to said CCMS; and

causing the CCMS to control the ASC systems.

2. The method of claim 1 wherein the CCMS controls the ASC systems by detecting, discriminating, and declaring attacks with assigned confidence.
3. The method of claim 1 wherein the CCMS controls the ASC systems by assigning threats to individual ASC systems.
4. The method of claim 1 wherein the CCMS controls the ASC systems by countering threats.
5. The method of claim 1 wherein the CCMS controls the ASC systems by geo-locating launch locations.

Abstract

A method for operating a defense against Man Portable Air Defense Systems (MANPADS) threats. This method includes the steps of deploying a plurality of airborne countermeasures systems (ACS) on each of a plurality of aircraft; deploying a central countermeasures management system (CCMS) and networking the ASC systems to said CCMS; and causing the CCMS to control the ASC systems.

Cooperative Jamming of Multiple Threats

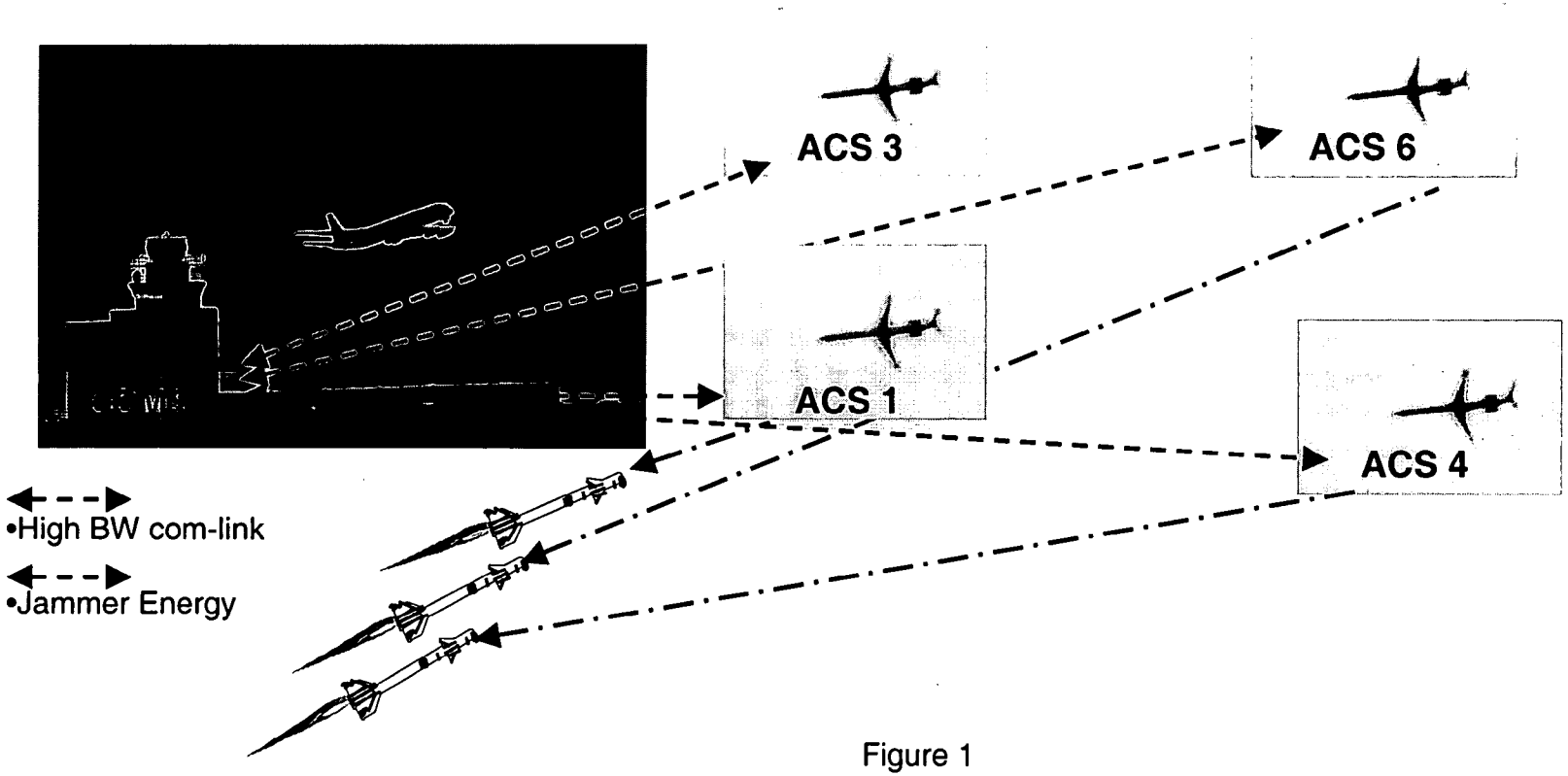

Figure 1

Information Architecture

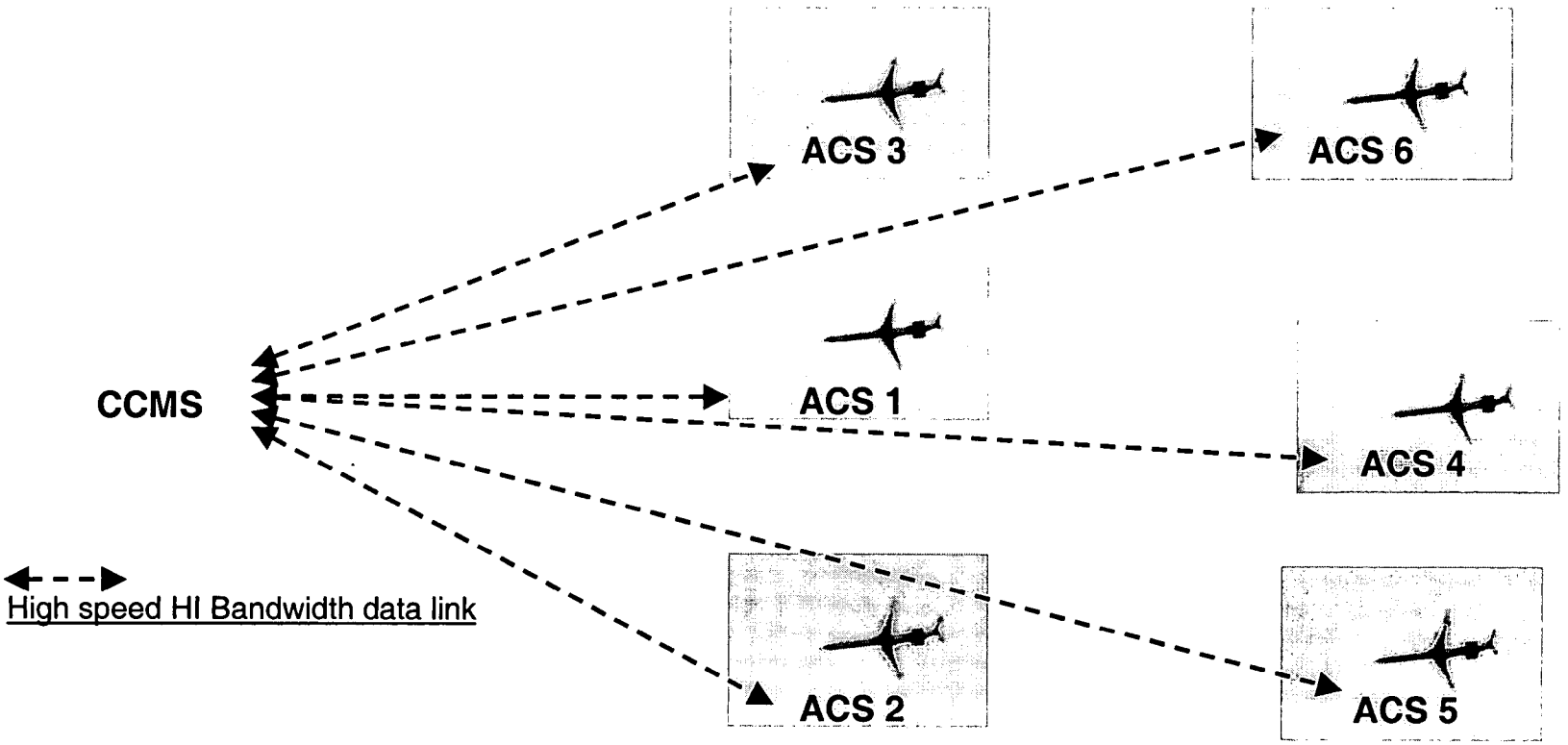

Figure 2

CCMS - Central Countermeasures Management System
ACS - Airborne Countermeasures Systems

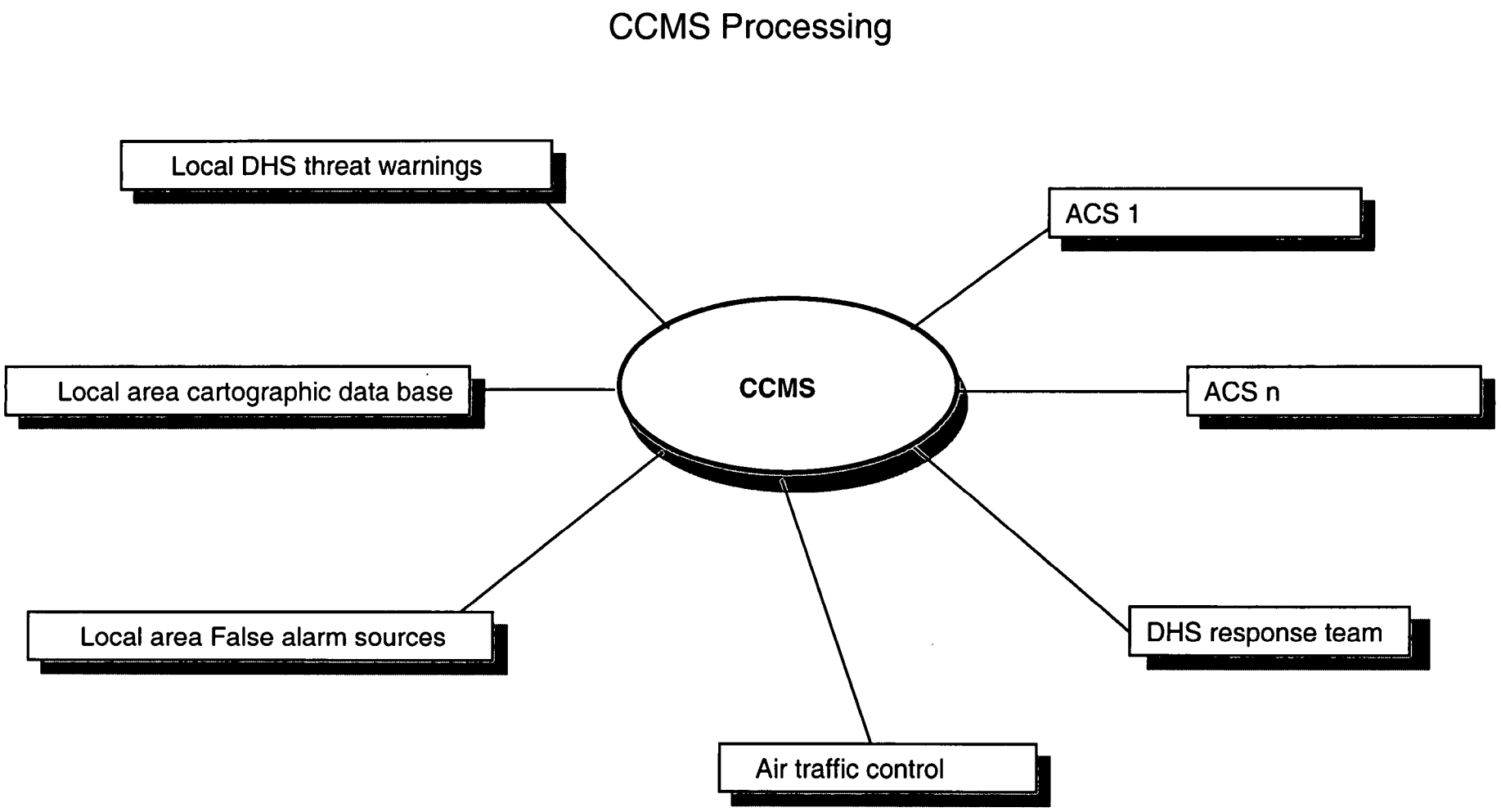
CCMS Processing
Local DHS threat warnings
ACS 1
Local area cartographic data base
CCMS
ACS n
Local area False alarm sources
DHS response team
Air traffic control

Figure 3

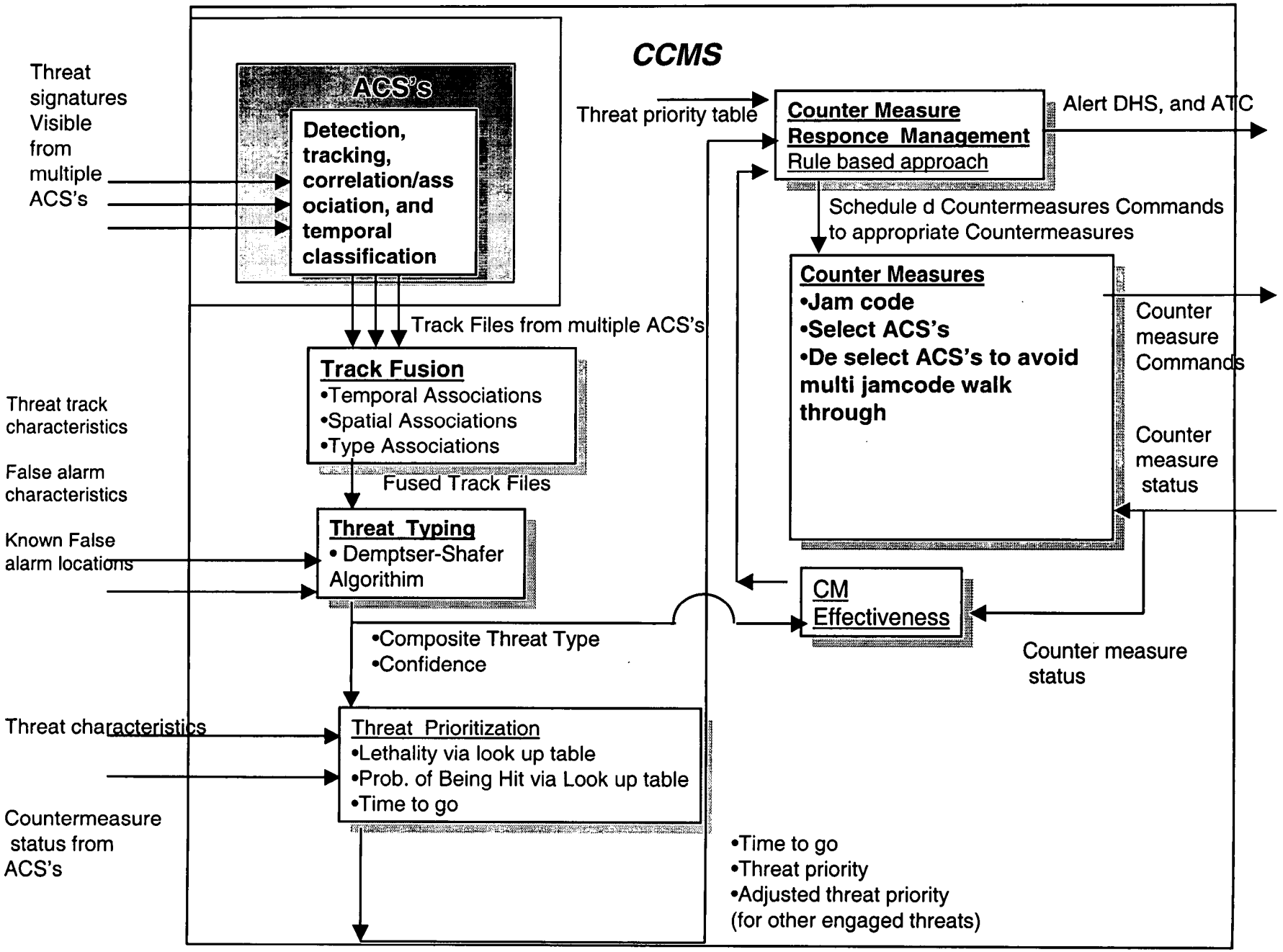
CCMS
Threat signatures Visible from multiple ACS's
ACS's
Detection, tracking, correlation/association, and temporal classification
Track Files from multiple ACS's
Track Fusion
•Temporal Associations
•Spatial Associations
•Type Associations
Fused Track Files
Threat track characteristics
False alarm characteristics
Known False alarm locations
Threat_Typing
• Demptser-Shafer Algorithim
•Composite Threat Type
•Confidence
Threat characteristics
Threat_Prioritization
•Lethality via look up table
•Prob. of Being Hit via Look up table
•Time to go
Countermeasure status from ACS's
•Time to go
•Threat priority
•Adjusted threat priority
(for other engaged threats)
Threat priority table
Counter Measure Responce Management
Rule based approach
Alert DHS, and ATC
Schedule d Countermeasures Commands to appropriate Countermeasures
Counter Measures
•Jam code
•Select ACS's
•De select ACS's to avoid multi jamcode walk through
Counter measure Commands
Counter measure status
CM Effectiveness
Counter measure status

Figure 4